

State of Illinois, Department
of Registration and Education
STATE GEOLOGICAL SURVEY, URBANA

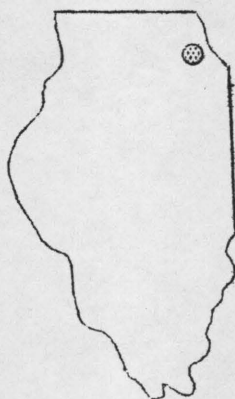
JOHN C. FRYE, Chief

GUIDE LEAFLET

GEOLOGICAL SCIENCE FIELD TRIP

WHEATON - WEST CHICAGO AREA

WHEATON AND GENEVA QUADRANGLES



Leader:
Ed Odom

Urbana, Illinois
July 18, 1961

HOST: FOREST ROAD SCHOOL

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Illegui
1961
Wheaton

Prairie Lib

WHEATON - WEST CHICAGO
Summer Elementary Science Workshop

ITINERARY

Dis- Mile-
tance age

- | | | |
|-----|------|---|
| 0.0 | 0.0 | Start in front of Library. |
| 0.7 | 0.7 | Go west on Franklin Street. STOP. Turn right on Gary Avenue. |
| 0.4 | 1.1 | Turn northwest. Stay on Gary Ave. |
| 2.0 | 3.1 | CAUTION. Railroad Crossing. |
| 0.3 | 3.4 | STOP. Turn left (west) on Route 64. |
| 1.9 | 5.3 | We are now climbing the back slope of the West Chicago moraine. |
| 2.7 | 8.0 | Stop light. Turn right on Route 59. Highway 59 travels more or less along the crest of the West Chicago moraine of the Wisconsin Glacial Stage. Note flat country to west, which is outwash plain formed in front of the moraine. We travel along the moraine for a distance of 6 miles. The rolling topography, ponds and undrained depressions, occasional large erratic boulders are characteristic of moraines. The West Chicago moraine is part of the Valparaiso Morainic System, a very prominent topographic feature extending widely through the Western Lakes Region. |
| 3.1 | 11.1 | CAUTION. Railroad Crossing. |
| 0.8 | 11.9 | Turn left (west). |
| 0.4 | 12.3 | <u>STOP 1.</u> Here we will examine the exposure of glacial till of Late Wisconsin age. |
| 0.7 | 13.0 | <u>STOP 2.</u> West edge of West Chicago moraine. Note the till exposure and the flat outwash plain. |
| 0.5 | 13.5 | CAUTION. Railroad Crossing. |
| 1.4 | 14.9 | Highway Junction. STOP. Turn right (north). |
| 0.3 | 15.2 | CAUTION. Highway intersection. STOP. Continue ahead. |
| 0.8 | 16.0 | SLOW. Turn right (east). |
| 0.1 | 16.1 | <u>STOP 3.</u> Gravel pit in outwash terrace (formed at the West Chicago advance.) Note the sorting and stratification of sand and gravel, absence of clay, better rounding of pebbles as compared with till. |
| 0.2 | 16.3 | Continue ahead, turn around. |
| 0.3 | 16.6 | Return to the highway. STOP. |
| 0.1 | 16.7 | Jog right and left (west).
CAUTION. Railroad crossing. |
| 0.3 | 17.0 | We are now descending from the terrace into the river flats. |

- 0.5 17.5 In the poorly drained flats note the hummocky, peaty surface of the swamp on the left.
- 0.6 18.1 STOP. Turn right.
- 0.1 18.2 STOP. Turn left.
- 0.2 18.4 Cross Fox River.
- 0.2 18.6 STOP. Turn right.
- 0.1 18.7 STOP. Turn left.
- 0.9 19.6 STOP. Highway intersection, turn left on Highway 430.
- 1.1 20.7 CAUTION. Railroad Crossing.
- 0.3 21.0 STOP. Turn right on Route 31.
- 0.1 21.1 STOP 4. Fox River Stone Company. The quarry exposes at least 35 feet of thin bedded Silurian, Kankakee Dolomite, which contains fossils including coral, crinoids, hydrocorallines, bryozoa, brachiopods, gastropods, cephalopods and trilobites. At the top of the quarry is a smooth surface which widely marks the top of the Kankakee formation. Above this may be seen a few inches of the buffy and more porous Joliet Dolomite, also of Silurian Age.
- 0.6 21.7 Silver Glen. This geln cuts down through the Silurian Dolomite into the Maquoketa Shale of Ordovician age. The shale and included dolomite members are fossiliferous.
- 4.0 25.7 STOP. Turn left (east) in St. Charles.
- 0.2 25.9 Traffic light. Turn right (south).
- 1.9 27.8 Traffic lights in Geneva. Continue ahead.
- 0.7 28.5 Traffic lights. Continue ahead.
- 0.4 28.9 Turn left (east).
- 0.1 29.0 Turn right (south). Enter quarry park, Batavia.

STOP 5. LUNCH

- 0.2 29.2 Leave quarry park. STOP. Turn right.
- 0.4 29.6 Go north to traffic light. Turn right (east).
- 0.3 29.9 Traffic light Turn right (south).
- 0.5 30.4 Go south to old abandoned quarry in Kankakee Formation.

STOP 6. This is the upper part of this middle Silurian formation, characterized by layers of white chert nodules. Lying below this are layers of clayey dolomites, the bedding planes of which are marked by furrows of unknown organisms that scavenged the ancient sea bottoms. Note the

conspicuous dip of the rocks to the west.

- 0.5 30.9 Reverse route and return to Route 25. Turn left (west).
- 0.3 31.2 Traffic light. Turn left (south).
- 0.2 31.4 Traffic light. Turn right (west).
- 1.8 33.2 SLOW. Turn left on gravel road. This road passes over a portion of the Marseilles moraine. Note the marshes and undrained depressions.
- 1.9 35.1 Turn hard right (north).
- 1.0 36.1 STOP 7. Peat deposit developed in a now extinct lake that once occupied a depression in an old channel of the Fox River Cut-off.
- 0.4 36.5 CAUTION. STOP. Turn left on black-top road (Batavia Road). For the next two miles to Bald Knob, the route crosses the Fox River Cut-off Channel. (For further information see section of geologic history.)
- 2.0 38.5 Bald Knob. Cross Sugar Grove - Geneva Road. Bald Mound is made up primarily of glacial till of Gilberts Age, but has gravel of Marseilles Age on its summit. Johnsons Mound, 2 miles northwest, is a true kame of the moulin type. Both these features suggest that Gilberts ice became stagnant, and portions of it melted very slowly.
- 0.5 39.0 Junction with road north to LaFox. Continue west. Route for the next 2 miles, over Gilberts ground moraine, in places is overlain by Marseilles outwash.
- 2.6 41.6 STOP 9. Gravel pit in kame. A number of kames were formed along the small east-west valley here, indicating that it was a drainage channel under the Gilberts glacier.
- 0.2 41.8 STOP. Intersection with Route 47. Turn left (south) on 47.
- 3.5 45.3 STOP 10. Go south on Route 47. Turn left into yard of gravel pit in the Kaneville esker. This esker marks the channel of a glacial stream which flowed between ice walls under the Gilberts glacier. This is the largest esker in Illinois. It extends northwest nearly five miles from this point, and nearly three miles in a southeasterly direction. In the latter direction it was over-ridden by the ice of the Marseilles glacier, whose advance stopped only a very short distance east of this point.

GEOLOGIC HISTORY OF THE AREA

DEEPLY BURIED FORMATIONS

The oldest bedrock strata that come to the surface in the field trip area are shale and limestone of late Ordovician Age. The accompanying geologic column shows that the beds, lying low in the Paleozoic system, are very ancient. Deep well-borings show that beneath them are older dolomites and sandstones of Ordovician Age, under which lies a thick series of Cambrian sandstones, dolomites, and shales. The deepest borings reveal red sandstones belonging to the very ancient pre-Cambrian complex. Many of the Cambrian and Ordovician layers contain abundant fossils of marine animals. They show clearly that in ancient time seas covered Illinois and the interior of the North American continent.

ORDOVICIAN STRATA

The upper Ordovician shales and limestones that crop out beneath jutting ledges of Silurian dolomite along Fox River belong to the Maquoketa Formation. The beds contain abundant fossils, notably brachiopod shells and coral-like bryozoa. Because the shales are soft and weak and the overlying Silurian dolomite is strong and firm, this combination of strata has caused small cascades to develop in the rocky glens along Fox River from Elgin to St. Charles.

SILURIAN STRATA

The Silurian strata that lie above the Maquoketa Formation are dolomites belonging to the Edgewood, Kankakee, and Joliet Formation, in ascending order. The formations range from Lower to Middle Silurian in age and are distinguished from one another by differences in character of the dolomite and of the fossil content. The dolomites are a valuable mineral resource quarried for building stone, crushed to use for roads and concrete, and ground for agstone to sweeten the soil.

YOUNGER PALEOZOIC STRATA

The Silurian strata are the youngest bedrock now present in the area, but younger strata of Devonian and Mississippian age once covered the region, with a possibility that Pennsylvanian stratum also was once present.

LONG INTERVAL OF EROSION

Since beds of these ages were deposited in the area, there has been ample time for their subsequent removal by the wearing-down forces of erosion. The region has been a land area, from which earth and stone have been worn away by water and wind since late in the Paleozoic Era. As a result, there remains little or no direct evidence of the geologic events that took place during those hundreds of millions of years of geologic time. Not until the geologic yesterday, when the glacial ice sheets moved down from the arctic, do we again find deposits, in the form of glacial debris, which can be used as evidence in the reconstruction of the area's geologic history.

GLACIAL PERIOD

To the geologist, the Glacial, or Pleistocene epoch merges gradually with the present. A mere 12,000 years or so has elapsed since the last ice sheet melted away, and in that short span erosion has only just begun to strip away the glacial

deposits. Thus we can work out the Pleistocene history in considerable detail. We know, for instance, that during the Pleistocene there were four separate major advances of continental glaciers with intervals of warm climate between. The warm intervals lasted far longer than the length of time since the last ice sheet, the Wisconsinan, disappeared from this region. Before the Wisconsinan ice sheet was the Illinoian, preceded by the Kansan, and that in turn by the Nebraskan.

We do not know, through lack of evidence, whether all four of the ice sheets covered the present area; but there is definite record of the Illinoian and abundant evidence of the Wisconsinan. Between the two glacial invasions, a mild climate lasted a hundred thousand years or so. During the interval there first accumulated over the uplands a blanket of wind-blown dust that the winds picked up from the raw glacial deposits in the sediment-choked rivers, sifting it gently across the prairies and highlands. In time, soils developed, and the humic acids and downward percolating rain waters (high in carbonic acid) leached and chemically changed the underlying glacial drift and debris.

MORAINES

The region visited by the field excursion is one famous in North America for the complexity of its glacial history and the remarkable preservation of its glacial deposits. Deposits of continental glaciers assume many forms and conditions. First, there are the moraines, composed largely of glacial till. Till is a mixed and unsorted mass of clay, silt, sand, pebbles, cobbles, boulders--whatever material was incorporated in the glacial ice and was left behind when the glacier melted away. Till is generally present as a more or less continuous blanket covering the surface over which the glacier moved. In areas where the glacier receded rapidly, the till blanket may be relatively level and thin; this is the "ground moraine." Where melting and forward movement were balanced, so that the ice margin was stable for a long period, "terminal moraines" developed. They are characterized by greater elevation and a rolling or "knob and kettle" topography and commonly show numbers of large glacial boulders, or "erratics." In addition to the till deposits are glacio-fluvial or glacio-lacustrine deposits--that is, glacial drift that has been transported and deposited by the melt water from the glaciers. The most outstanding deposits of this type are glacial outwash, eskers, and kames.

GLACIAL OUTWASH

When the ground in front of a melting glacier slopes gently away from the ice front, the waters streaming down slope from the melting ice deposit sand and gravel in alluvial fans. The fans eventually merge to form an outwash apron or outwash plain. The most evident outwash plain to be observed along the field trip route is that in front of the West Chicago moraine.

KAMES

When ground in front of a glacier slopes toward the glacier, the waters from the melting ice are ponded and glacial lakes are formed, surrounded by high ground on the one side and by the high ice wall on the other. When streams flowing out of the melting ice enter such temporary lakes, deltas are formed which have one side built against the ice wall. When the ice wall melts away, the delta slumps to a rounded knoll of sand and gravel, called a "kame." A typical kame may be seen east of the Junction between Highway 47 and the Batavia Road.

ESKERS

The streams which flow upon or under a melting glacier deposit sand and gravel in their channels just as other streams do. When the ice which walled the banks of these glacial streams melts away, the stream bed is left as a more or less winding raised embankment stretching across the country like a meandering railroad grade. Generally its interior will have been hollowed out by man, because eskers are important sources of clean, fresh sand and gravel. The Kaneville Esker northwest of Sugar Grove is the longest in Illinois.

MORAINES IN THE WEST CHICAGO REGION

In that tract of country lying between Illinois Highways 59 and 47 along the general latitude of Lily Lake - W. Chicago, the following moraine lines are encountered in going from east to west:

Woodfordian Substage
West Chicago Moraine
Minooka Moraine
Marseilles Moraine
Gilberts Moraine
Marengo Ridge

HISTORY OF FOX RIVER

Before the coming of the Wisconsin glacier, Fox River did not exist. A study of the bedrock surface shows the existence of a well-developed natural drainage pattern that has no relation to that in the area today.

The first occurrence of a sizeable stream along the general course of the present day Fox appears to have developed late in the Marseilles phase of glaciation, when the ice front had melted back until it lay east of where the river now flows. Water from the melting ice, in seeking to find its way southward down slope in front of the glacier, developed the ancestral Fox Valley.

During the next, or Minooka phase, the glacier pushed forward again and crossed the ancestral Fox from St. Charles north to Elgin. The ice blockade caused the river to swing westward and carve a new channel well shown in the vicinity of the State School for boys, 3 miles west of St. Charles.

Your route crosses the Fox River cut-off just east of Bald Knob. Southward the cut-off followed several different courses at different times.

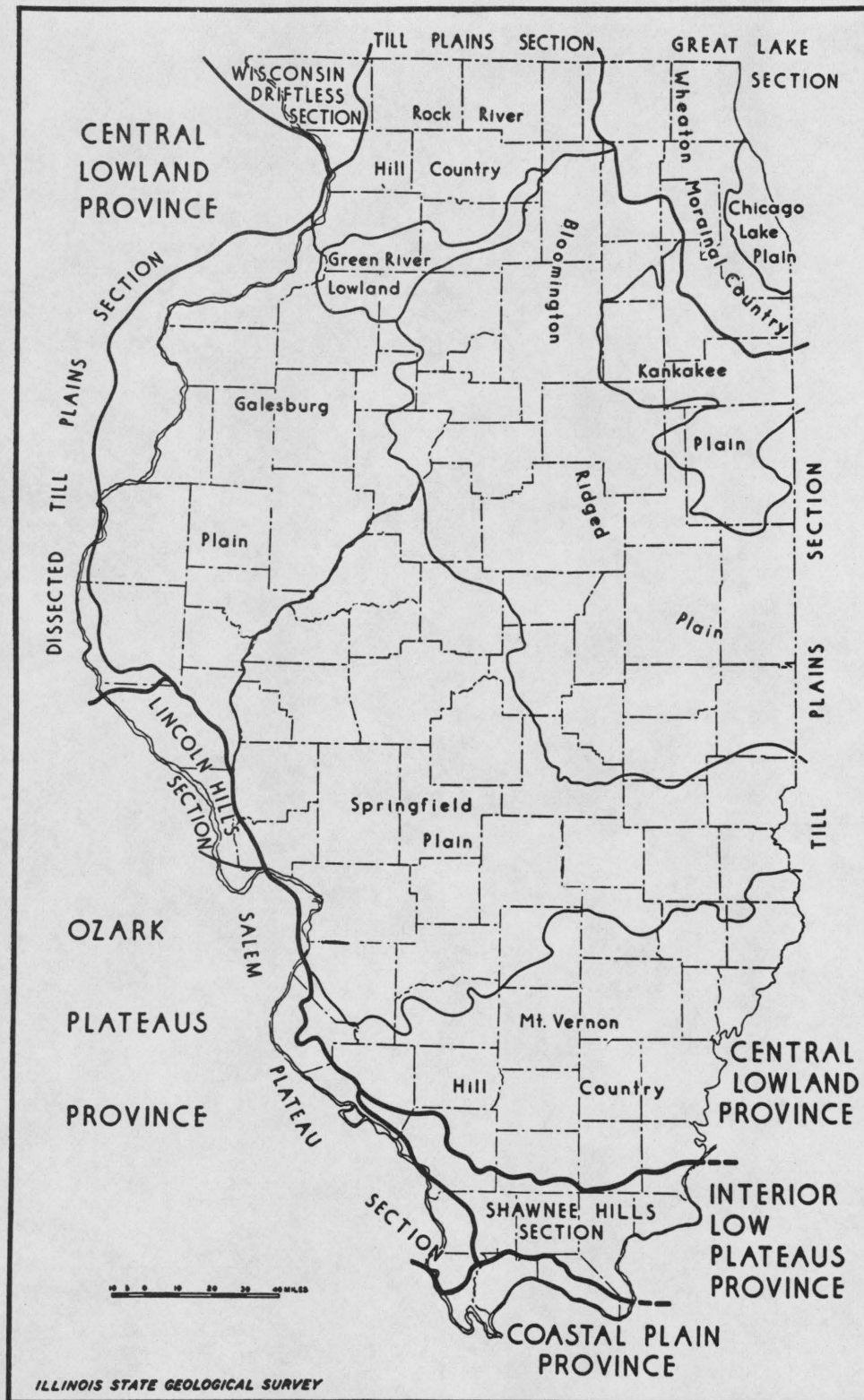
Finally, when the Minooka readvance was dissipated by melting, the river regained its old valley. Later, when the Wisconsin glacier stood along the line of the West Chicago moraine, great quantities of sand and gravel were discharged westward into the valley, which built its floor of sediment up to the high level of the gravel terrace that flanks the river today. Since then, the river has been lowering its channel as it proceeds to cut away the fill of West Chicago glacial outwash.

Reprinted July, 1961.

GENERALIZED GEOLOGIC COLUMN
FOR WEST CHICAGO AREA
Prepared by the Illinois State Geological Survey

ERAS		PERIODS	EPOCHS	FORMATIONS
Cenozoic "Recent Life"	Age of Mammals	Quaternary	Pleistocene	*Recent post-glacial stage *Wisconsinan glacial stage *Sangamonian interglacial stage *Illinoian glacial stage Yarmouthian interglacial stage Kansan glacial stage Aftonian interglacial stage Nebraskan glacial stage
		Tertiary	Pliocene Miocene Oligocene Eocene	Not present in West Chicago Area
Mesozoic "Middle Life"	Age of Reptiles	Cretaceous		Present in extreme southern Illinois only
		Jurassic		Not present in Illinois
		Triassic		Not present in Illinois
Paleozoic "Ancient Life"	Age of Amphibians and Early Plants	Permian		Not present in Illinois
		Pennsylvanian		Not present in West Chicago Area
		Mississippian	Upper	Not present in West Chicago Area
			Lower	
	Age of Fishes	Devonian		Not present in West Chicago Area
	Age of Invertebrates	Silurian	Upper	
			Middle	*Joliet dolomite
			Lower	*Kankakee dolomite *Edgewood dolomite
		Ordovician	Upper	*Maquoketa shales & limestones
			Middle	Dolomites and sandstone lying 200 feet below surface
			Lower	
		Cambrian		Sandstones & dolomites lying over 1,000 ft. below the surface
Proterozoic		Referred to as "Pre-Cambrian" time.		
Archeozoic				
		* Deposits present in West Chicago Area		

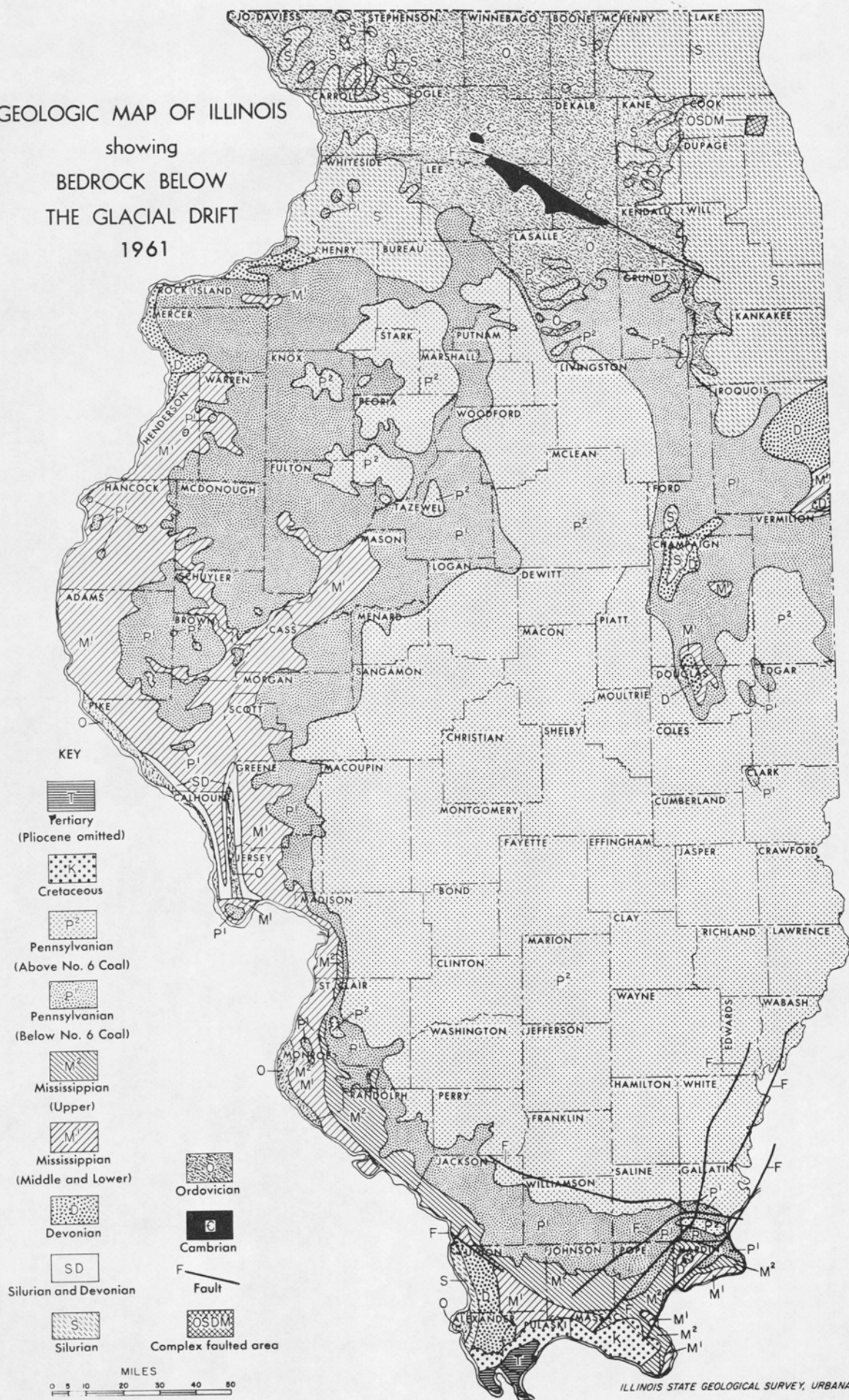




PHYSIOGRAPHIC DIVISIONS OF ILLINOIS

(Reprinted from Illinois State Geological Survey Report of Investigations 129, "Physiographic Divisions of Illinois," by M. M. Leighton, George E. Ekblaw, and Leland Horberg)

GEOLOGIC MAP OF ILLINOIS
showing
BEDROCK BELOW
THE GLACIAL DRIFT
1961



COMMON TYPES of ILLINOIS FOSSILS



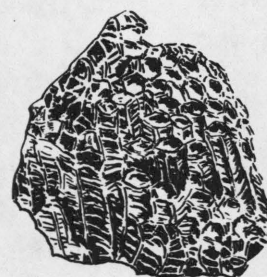
GRAPTOLITE



Cup coral

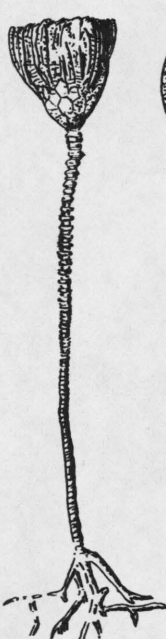


Lithostrotion



Honeycomb coral

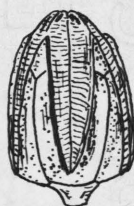
CORALS



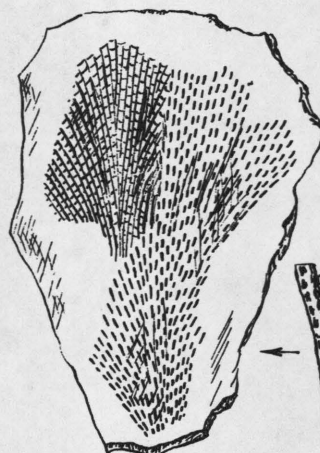
CRINOID



CYSTOID



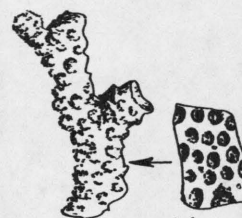
PENTREMITE



Fenestella



Archimedes



Branching

BRYOZOA



Lingula



Orbiculoidea



Spiriferoid



Productoid



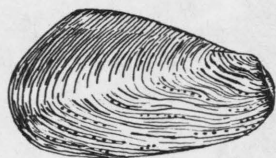
Composita



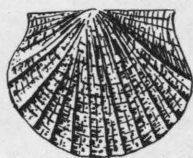
Pentameroid

BRACHIOPODS

COMMON TYPES of ILLINOIS FOSSILS



"Clam"



"Scallop"

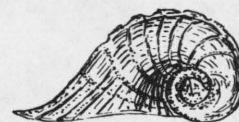
PELECYPODS



High - spired



Low - spired



Flat - spired

GASTROPODS



Curved cone



Straight cone

CEPHALOPODS



Coiled cone
(Nautilus)



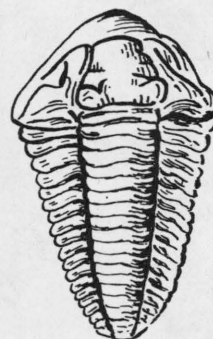
Bumastus



Calymene
(coiled)



OSTRACODS
(greatly enlarged)



Calymene
(flat)

TRILOBITES